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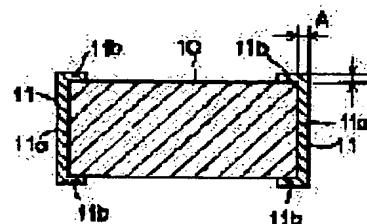
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## (54) CHIP-LIKE ELECTRONIC PART AND ITS MANUFACTURING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain chip-like electronic parts which have excellent stability and electronic contact and can be stuck to a ceramic material in an excellent state and in which the shapes and dimensions of external electrodes do not vary much.

SOLUTION: Chip-like electronic parts are composed of a ceramic material 10 and external electrodes 11 and 11 provided at both end sections of the material 10. The surface of each electrode 11 is formed in a flat surface and the ratio of the thickness B of the folded part 11b of the electrode 11 to the thickness A of the end face section 11a of the electrode 11 is set at  $0.6 < B/A < 1.0$ . The electrodes 11 are formed by press-contacting conductive paste/adhesive applied to the end sections of the material 10 with blocks while the paste/adhesive is in an uncured state.



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**CLAIMS**

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[Claim(s)]

[Claim 1]In a chip like electronic component which provided exterior electrodes of ceramic element assemblies which consist of a conductive binder at least in both ends, A chip like electronic component which a ratio of clinch part width dimension B to end face part width dimension A of said exterior electrodes is  $0.6 < B/A < 1.0$ , and is characterized by fabricating the surface of said exterior electrodes evenly.

[Claim 2]A manufacturing method of the chip like electronic component according to claim 1 characterized by comprising the following.

A process of applying a conductive binder to an end of ceramic element assemblies.

A process of making a conductive binder and a mold material for shaping which were applied welding by pressure, and carrying out flattening of the surface of this binder.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]A chip inductor, a chip capacitor, a chip filter, etc. are electronic parts of a chip type in detail, and this invention relates to a chip like electronic component and a manufacturing method for the same, a chip like electronic component that provided the exterior electrodes of ceramic element assemblies which consist of a conductive binder at least in both ends, and a manufacturing method for the same.

[0002]

[Description of the Prior Art]If it is in a chip like electronic component, for example, a laminated ceramic capacitor, conventionally, as shown in drawing 3, conductive paste was applied to the both ends of the ceramic element assemblies 1 with dip coating or a replica method, it printed after that, and the exterior electrodes 2 are provided. the exterior electrodes 2 are surroundings \*\*\*\* in the end face part 2a and a surface and rear surface -- it consists of clinch part 2b and 2b.

[0003]This kind of chip-like electronic component is supplied to a user as an electronic parts run which it stored at a time to one accommodation hole of a large number formed in the long taping material. In the user, it took out one chip like electronic component at a time from the accommodation hole with the adsorption machine, and has mounted on a predetermined substrate.

[0004]

[Problem(s) to be Solved by the Invention]By the way, in order to stiffen conductive paste with an application state, the surface of exterior electrodes was curving and shape and a size differed in said conventional chip like electronic component. So, it was easy to move in the accommodation hole of a taping material, and also became carrying out point contact to the nozzle face of an adsorption machine, and the adsorption mistake had occurred at the time of drawing. It was, also when were mounted on a substrate, and stability was bad and produced what is called a TSUMU stone phenomenon. If it was at the time of characteristic measurement, the terminal for measurement and exterior electrodes became point contact, and there was a possibility that a measurement error might arise. Or also when it could not but dispose as inferior goods depending on the defect of shape of exterior electrodes, or dispersion of a size, it was.

[0005]Then, the purpose of this invention is flat in exterior electrodes, and there is in being able to cancel said various kinds of faults, and the adhesion of exterior electrodes providing a good chip like electronic component and a manufacturing method for the same by lessening dispersion in shape or a size.

[0006]

[Means for Solving the Problem and its Function]In a chip like electronic component in which this invention provided exterior electrodes of ceramic element assemblies which consist of a conductive binder at least in both ends in order to attain the above purpose, A ratio of clinch part width dimension B to end face part width dimension A of said exterior electrodes is  $0.6 < B/A < 1.0$ , and the surface of exterior electrodes is fabricated evenly.

[0007]Exterior electrodes consist of a clinch part which was prolonged to an end face part adhering to both ends of ceramic element assemblies, and the upper and lower sides which follow it a little, and adhered to them, and flattening of these surfaces is carried out, without curving. Therefore, an accommodation hole of a taping material and stability at the time of mounting on a substrate are good. Not by other members and point contact but by field contact, exterior electrodes are stabilized and contact. fault of shortage of bond strength by a thing to depend on it being too thick, or thickness of a clinch part not being too thin, turning into suitable thickness, and being too thick and it separates and is [ a thing ] too thin is not produced by setting up a value of said B/A within the limits of 0.6-1.0.

[0008]Said chip like electronic component is manufactured through a process of making a process of applying a conductive binder to an end of ceramic element assemblies, and a conductive binder and a mold material for shaping which were applied welding by pressure, and carrying out flattening of the surface of this binder. With a binder, conductive paste, electroconductive glue, etc. are used and it is applied to an end of ceramic element assemblies by techniques, such as dip coating and a replica method. And as a binder hardens, it is made to weld by pressure to a mold material for shaping, and the surface of exterior electrodes is fabricated evenly. If a binder is conductive paste, it will burn after shaping.

[0009]

[Embodiment of the Invention]Hereafter, the embodiment of a chip like electronic component concerning this invention and a manufacturing method for the same is described with reference to an accompanying drawing.

[0010]Drawing 1 shows the laminated ceramic capacitor of a chip type. This capacitor is what laminated and calcinated two or more ceramic sheets in which the internal electrode was formed, and the internal structure of the ceramic element assemblies 10 is common knowledge. The exterior electrodes 11 and 11 applied conductive paste or electroconductive glue to the both ends of the ceramic element assemblies 10, and fabricated evenly the surface of the end face part 11a and the clinch part 11b in the stage which they do not harden.

[0011]Conductive paste / adhesives 11' is applied to the end of the ceramic element assemblies 10 by techniques, such as dip coating and a replica method, and in the state where it was applied, as shown in drawing 2 (A), the surface is curving. Shaping is performed by making the paste / adhesives 11' of a semi hardened state weld by pressure to the section L-shaped mold material 21, or pressing it fit in the crevice 22a of (the drawing 2 (B) reference) and the mold material 22 (refer to drawing 2 (C)).

[0012]It is preferred to add the substance which delays hardening to conductive paste / adhesives 11'. When using conductive paste, it bakes after shaping. the case where electroconductive glue is used -- after shaping -- heat cure -- or it is made to harden automatically

[0013]By the way, as for the ratio of clinch part width dimension B [ as opposed to end face part width dimension A about the size of said exterior electrodes 11 ], being referred to as  $0.6 < B/A < 1.0$  is preferred. As opposed to the ceramic element assemblies (1.6 mm in length, this invention persons, 0.8 mm in width, and 0.8 mm in thickness) 10, When 20-25 mm was made for dimension a as an experiment and various 15-20-mm things or things of the size before and behind that were made for the size B as an experiment, it became clear that the thickness of the clinch part 11b became large too much relatively, and B/A separated easily in this portion one or more. On the other hand, it became clear that the thickness of B/A of the clinch part 11b was relatively small at 0.6 or less, and the adhesion force to the ceramic element assemblies 10 was weak. Therefore, it is the point of preventing poor generating of the exterior electrodes 11, and it is preferred to set up B/A within the limits of 0.6-1.0.

[0014]As electronic parts of the chip type with which this invention is applied, the LC composite part etc. which contained the inductor, the filter, the capacitor, and the coil in addition to the capacitor exist broadly.

[0015]

[Effect of the Invention]Since the surface of exterior electrodes was evenly fabricated by the above explanation according to this invention so that clearly, there is almost no dispersion in

shape or a size in exterior electrodes, and reduce the incidence rate of inferior goods, and. The stability at the time of mounting of the inside of the accommodation hole of a taping material or a up to [ a substrate ] becomes good, and the adsorption mistake at the time of drawing from a taping material and generating of the TSUMU stone phenomenon on a substrate can be prevented. As for exterior electrodes, contact with contact with an adsorption nozzle side, the terminal for measurement, etc. is stabilized, and they become, without an adsorption mistake and a measurement error occurring in order to contact to other members in a field. According to this invention, the ratio of clinch part width dimension B to end face part width dimension A of exterior electrodes is written with  $0.6 < B/A < 1.0$ . The width dimension of a clinch part can be made into a suitable value, and the exfoliation by being too thick or the shortage of bond strength by being too thin can be prevented.

[0016]In order according to the manufacturing method concerning this invention to make the conductive adhesive material and mold material which were applied to the end of ceramic element assemblies weld by pressure and to fabricate the surface evenly, exterior electrodes can be finished with sufficient accuracy at an easy process, and it has the advantage that a barrel-finishing process can also be skipped.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]The sectional view showing the chip like electronic component which is one embodiment of this invention.

[Drawing 2]The explanatory view showing the exterior-electrodes forming cycle of said chip like electronic component.

[Drawing 3]The sectional view showing the conventional chip like electronic component.

[Description of Notations]

10 -- Ceramic element assemblies

11 -- Exterior electrodes

11a -- End face part

11b -- Clinch part

A -- End face part width dimension

B -- Clinch part width dimension

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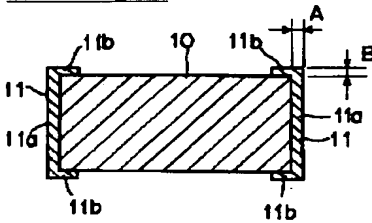
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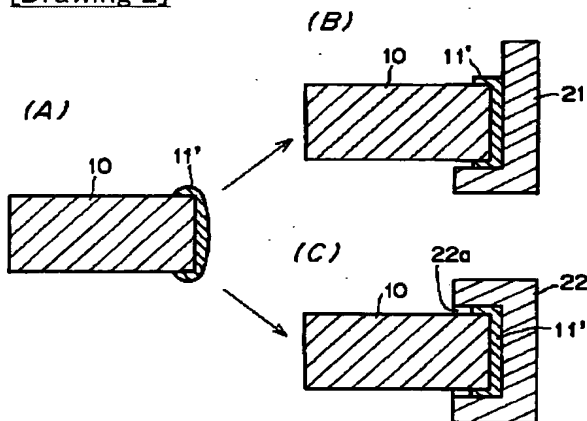
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## DRAWINGS

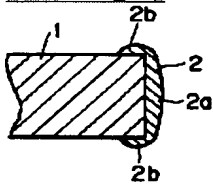
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

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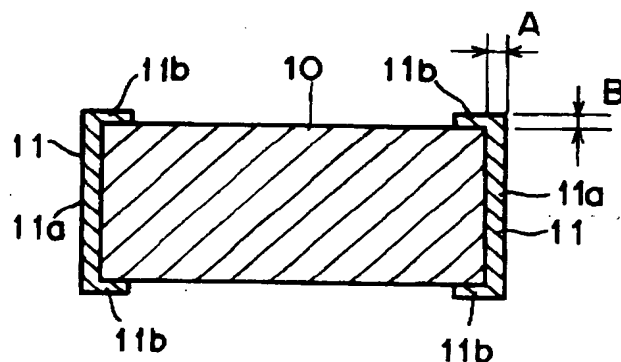
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(54) 【発明の名称】 チップ状電子部品及びその製造方法

(57) 【要約】

【課題】 安定性や接触性が良好で、外部電極の形状や寸法のばらつきが小さく、かつ、セラミック素体への付着性が良好なチップ状電子部品を得る。

【解決手段】 セラミック素体10の両端部に外部電極11, 11を設けたチップ状電子部品。外部電極11の表面は平坦に成形されており、端面部11aの厚さ寸法Aに対する折り返し部11bの厚さ寸法Bの比率は $0.6 < B/A < 1.0$ に設定されている。外部電極11はセラミック素体10の端部に塗布された導電性ペースト/接着剤を未硬化の状態で型材に圧接させることによって成形される。





## 【特許請求の範囲】

【請求項1】 セラミック素体の少なくとも両端部に導電性粘着剤からなる外部電極を設けたチップ状電子部品において、

前記外部電極の端面部厚さ寸法Aに対する折り返し部厚さ寸法Bの比率が、 $0.6 < B/A < 1.0$ であり、前記外部電極の表面が平坦に成形されていること、を特徴とするチップ状電子部品。

【請求項2】 請求項1記載のチップ状電子部品の製造方法において、

セラミック素体の端部に導電性粘着剤を塗布する工程と、  
塗布された導電性粘着剤と成形用型材とを圧接させて該粘着剤の表面を平坦化する工程と、  
を備えたことを特徴とするチップ状電子部品の製造方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、チップ状電子部品及びその製造方法、詳しくは、チップコイルやチップコンデンサ、チップフィルタ等チップタイプの電子部品であって、セラミック素体の少なくとも両端部に導電性粘着剤からなる外部電極を設けたチップ状電子部品及びその製造方法に関する。

## 【0002】

【従来の技術】 従来、チップ状電子部品、例えば積層セラミックコンデンサにあっては、図3に示すように、セラミック素体1の両端部に導電性ペーストを浸漬法あるいは転写法によって塗布し、その後焼き付けて外部電極2を設けている。外部電極2は、端面部2aと表裏面に廻り込んだ折り返し部2b、2bとからなっている。

【0003】 また、この種のチップ状電子部品は、長尺のテーピング材に形成された多数の収納穴に1個ずつ収納した電子部品連としてユーザーに供給される。ユーザーではチップ状電子部品を吸着機で収納穴から1個ずつ取り出し、所定の基板上にマウントしている。

## 【0004】

【発明が解決しようとする課題】 ところで、前記従来のチップ状電子部品では導電性ペーストを塗布状態のまま硬化させているために、外部電極の表面が湾曲しており、かつ、形状や寸法がばらついていた。それ故、テーピング材の収納穴内で動きやすく、吸着機のノズル面と点接触することにもなり、取出し時に吸着ミスが発生していた。また、基板上に実装されるとき安定性が悪く、いわゆるツームストーン現象を生じる場合もあった。さらに、特性測定時にあっては測定用端子と外部電極とが点接触となり、測定ミスが生じるおそれがあった。あるいは、外部電極の形状不良や寸法のばらつきによっては不良品として処分せざるを得ない場合もあった。

【0005】 そこで、本発明の目的は、外部電極を平坦

で、形状や寸法のばらつきを少なくすることにより、前記各種の不具合を解消することができ、かつ、外部電極の付着性が良好なチップ状電子部品及びその製造方法を提供することにある。

## 【0006】

【課題を解決するための手段と作用】 以上の目的を達成するため、本発明は、セラミック素体の少なくとも両端部に導電性粘着剤からなる外部電極を設けたチップ状電子部品において、前記外部電極の端面部厚さ寸法Aに対する折り返し部厚さ寸法Bの比率が、 $0.6 < B/A < 1.0$ であり、外部電極の表面が平坦に成形されていることを特徴とする。

【0007】 外部電極はセラミック素体の両端部に付着した端面部とそれに連続する上下面へ若干延びて付着した折り返し部とからなり、これらの表面は湾曲することなく平坦化されている。従って、テーピング材の収納穴や基板上の実装時の安定性が良好である。また、外部電極は他部材と点接触ではなく面接触で安定して接触する。さらに、前記B/Aの値を $0.6 \sim 1.0$ の範囲内に設定することにより、折り返し部の厚さが厚すぎたり薄すぎたりせず適切な厚さとなり、厚すぎることによる剥れ、薄すぎることによる付着強度の不足といった不具合は生じない。

【0008】 さらに、前記チップ状電子部品は、セラミック素体の端部に導電性粘着剤を塗布する工程と、塗布された導電性粘着剤と成形用型材とを圧接させて該粘着剤の表面を平坦化する工程とを経て製造される。粘着剤とは、導電性ペーストや導電性接着剤等が用いられ、浸漬法や転写法等の手法でセラミック素体の端部に塗布される。そして、粘着剤が硬化する途中で成形用型材に圧接させ外部電極の表面を平坦に成形する。粘着剤が導電性ペーストであれば成形後に焼付けを行う。

## 【0009】

【発明の実施の形態】 以下、本発明に係るチップ状電子部品及びその製造方法の実施形態について、添付図面を参照して説明する。

【0010】 図1はチップタイプの積層セラミックコンデンサを示す。このコンデンサは内部電極を形成した複数枚のセラミックシートを積層し、焼成したもので、セラミック素体10の内部構造は周知である。外部電極11、11はセラミック素体10の両端部に導電性ペーストあるいは導電性接着剤を塗布し、それらが硬化しない段階で端面部11a及び折り返し部11bの表面を平坦に成形した。

【0011】 導電性ペースト/接着剤11'は浸漬法や転写法等の手法でセラミック素体10の端部に塗布され、塗布された状態では図2(A)に示すように、表面は湾曲している。成形は、半硬化状態のペースト/接着剤11'を断面L形状の型材21に圧接させたり(図2(B)参照)、型材22の凹部22aに圧入すること

(図 2 (C) 参照) により行われる。

【0012】導電性ペースト／接着剤 11' に対しては硬化を遅らせる物質を添加することが好ましい。導電性ペーストを用いる場合は、成形後に焼付ける。導電性接着剤を用いる場合は、成形後に加熱硬化又は自然硬化させる。

【0013】ところで、前記外部電極 11 の寸法に関しては、端面部厚さ寸法 A に対する折り返し部厚さ寸法 B の比率は、 $0.6 < B/A < 1.0$  とすることが好ましい。本発明者らが、長さ 1.6 mm、幅 0.8 mm、厚さ 0.8 mm のセラミック素体 10 に対して、寸法 A を 20~25 mm、寸法 B を 15~20 mm のもの、あるいはその前後の寸法のものを種々試作したところ、 $B/A$  が 1 以上では、折り返し部 11b の厚さが相対的に大きくなりすぎ、この部分で剥れやすいことが判明した。一方、 $B/A$  が 0.6 以下では、折り返し部 11b の厚さが相対的に小さく、セラミック素体 10 への付着力が弱いことが判明した。従って、外部電極 11 の不良発生を防止する点で、 $B/A$  を 0.6~1.0 の範囲内に設定することが好ましいのである。

【0014】なお、本発明が適用されるチップタイプの電子部品としては、コンデンサ以外に、インダクタ、フィルタ、コンデンサとコイルを内蔵した LC 複合部品等幅広く存在する。

【0015】

【発明の効果】以上の説明で明らかなように、本発明によれば、外部電極の表面を平坦に成形したため、外部電極に形状や寸法のばらつきが殆どなく、不良品の発生率を低下させると共に、テーピング材の収納穴内や基板上\*

\* への実装時の安定性が良好となり、テーピング材からの取出し時の吸着ミス、基板上でのツームストーン現象の発生を防止することができる。また、外部電極は他部材に対して面で接触するため、吸着ノズル面との接触や測定用端子等との接触が安定し、吸着ミス、測定ミスが発生することともなくなる。さらに、本発明によれば、外部電極の端面部厚さ寸法 A に対する折り返し部厚さ寸法 B の比率を  $0.6 < B/A < 1.0$  としたため、折り返し部の厚さ寸法を適切な値とすることができ、厚すぎることによる剥離あるいは薄すぎることによる付着強度不足を防止することができる。

【0016】また、本発明に係る製造方法によれば、セラミック素体の端部に塗布された導電性粘着材と型材とを圧接させて表面を平坦に成形するため、簡単な工程で外部電極を精度よく仕上げることができ、パレル研磨工程を省略することもできるという利点を有する。

【図面の簡単な説明】

【図 1】本発明の一実施形態であるチップ状電子部品を示す断面図。

【図 2】前記チップ状電子部品の外部電極成形工程を示す説明図。

【図 3】従来のチップ状電子部品を示す断面図。

【符号の説明】

10…セラミック素体

11…外部電極

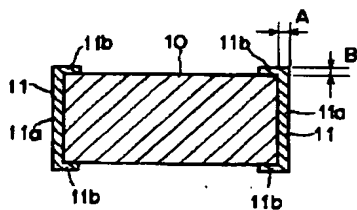
11a…端面部

11b…折り返し部

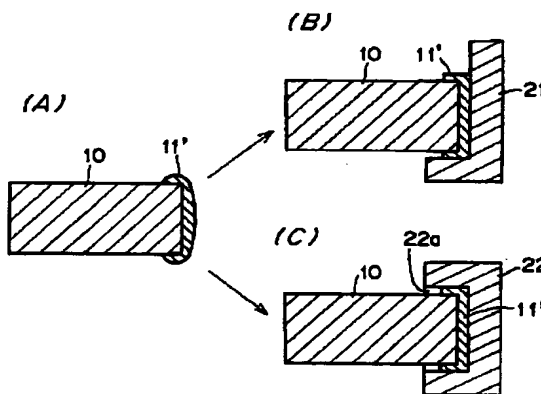
A…端面部厚さ寸法

B…折り返し部厚さ寸法

【図 1】



【図 2】



【図 3】

